

July 30, 1957

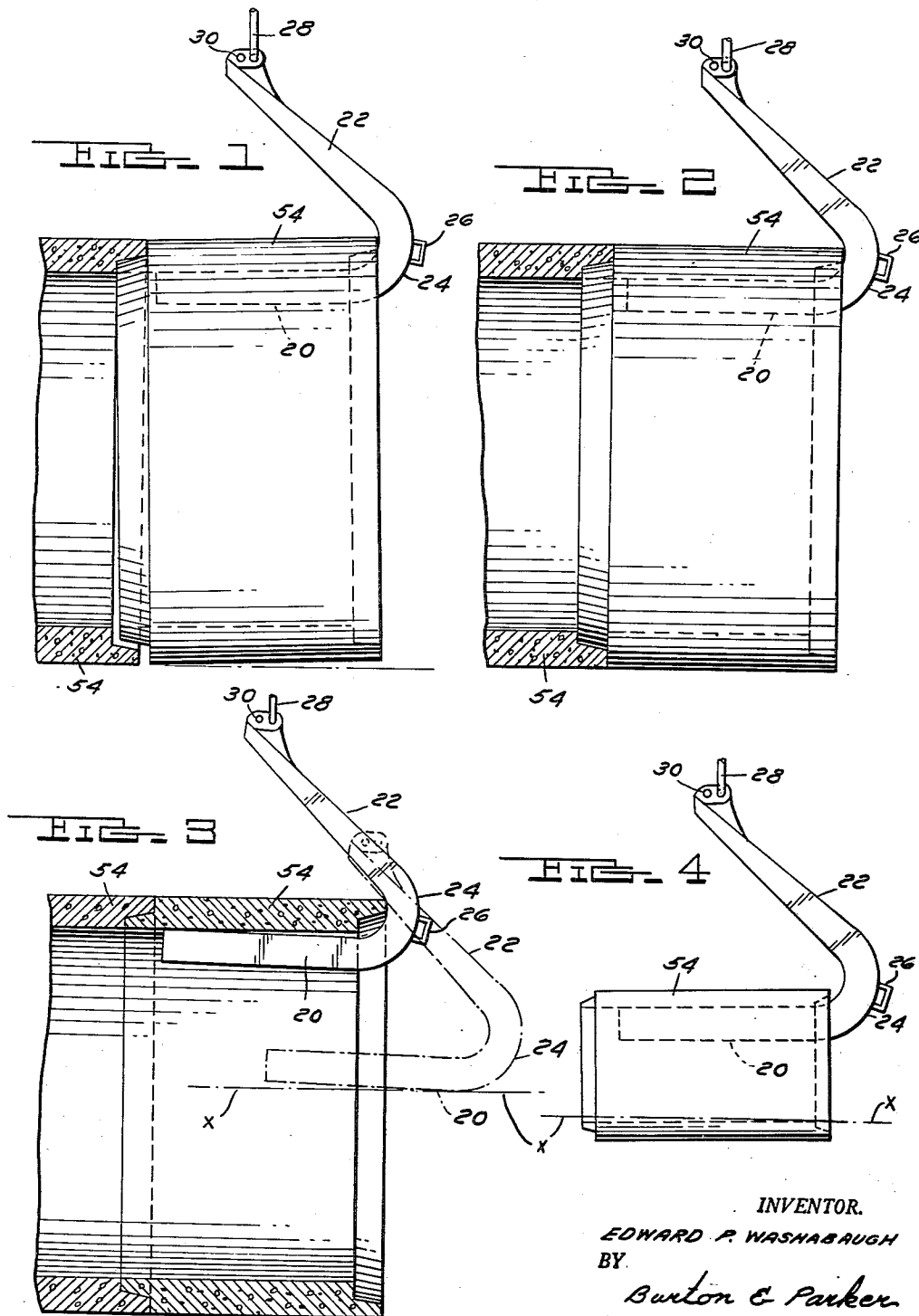
E. P. WASHABAUGH

2,801,128

PIPE LIFTING HOOK

Filed Aug. 23, 1951

3 Sheets-Sheet 1



July 30, 1957

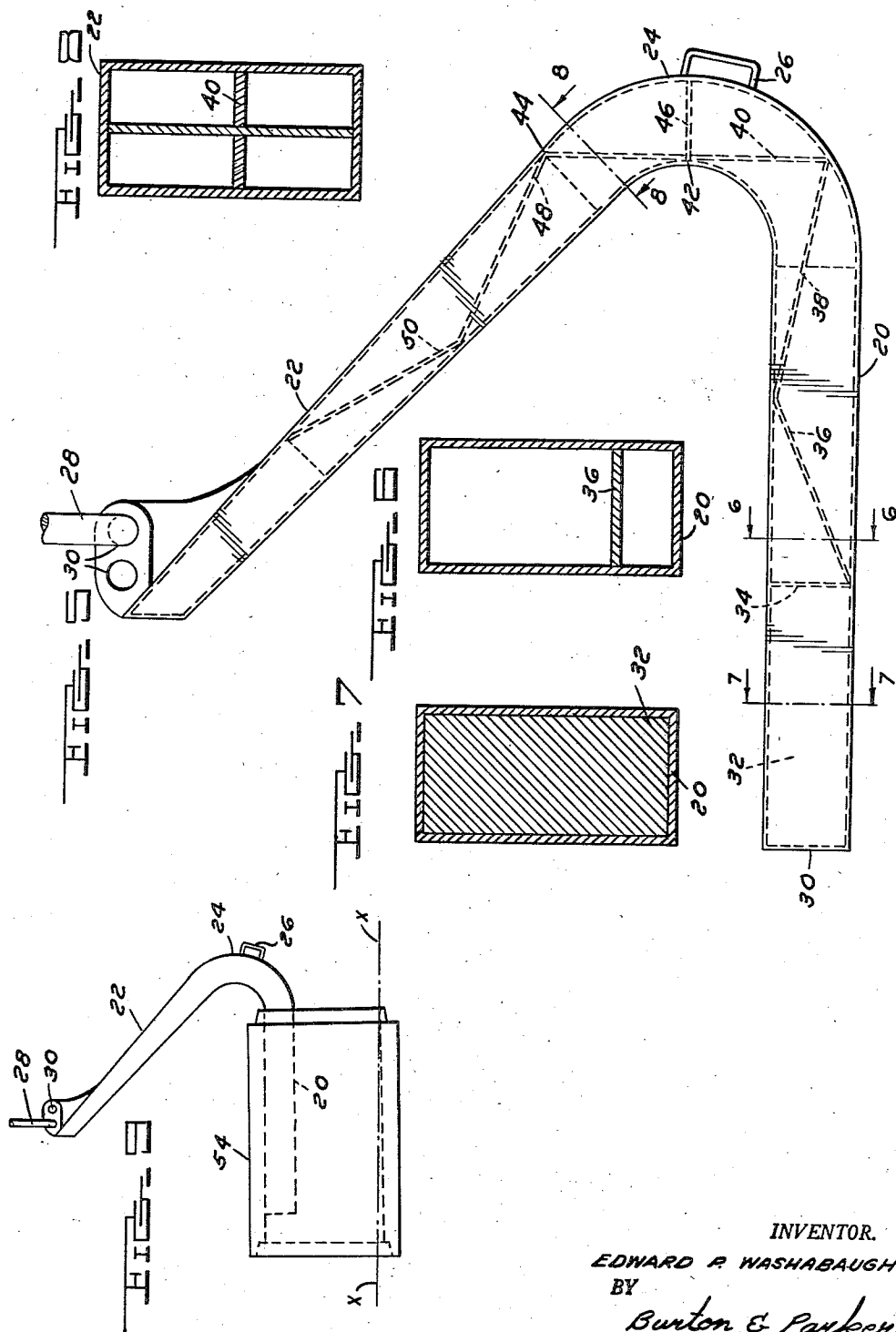
E. P. WASHABAUGH

2,801,128

PIPE LIFTING HOOK

Filed Aug. 23, 1951

3 Sheets-Sheet 2



INVENTOR.

EDWARD P. WASHABAUGH

BY

Burton & Parker

ATTORNEYS

July 30, 1957

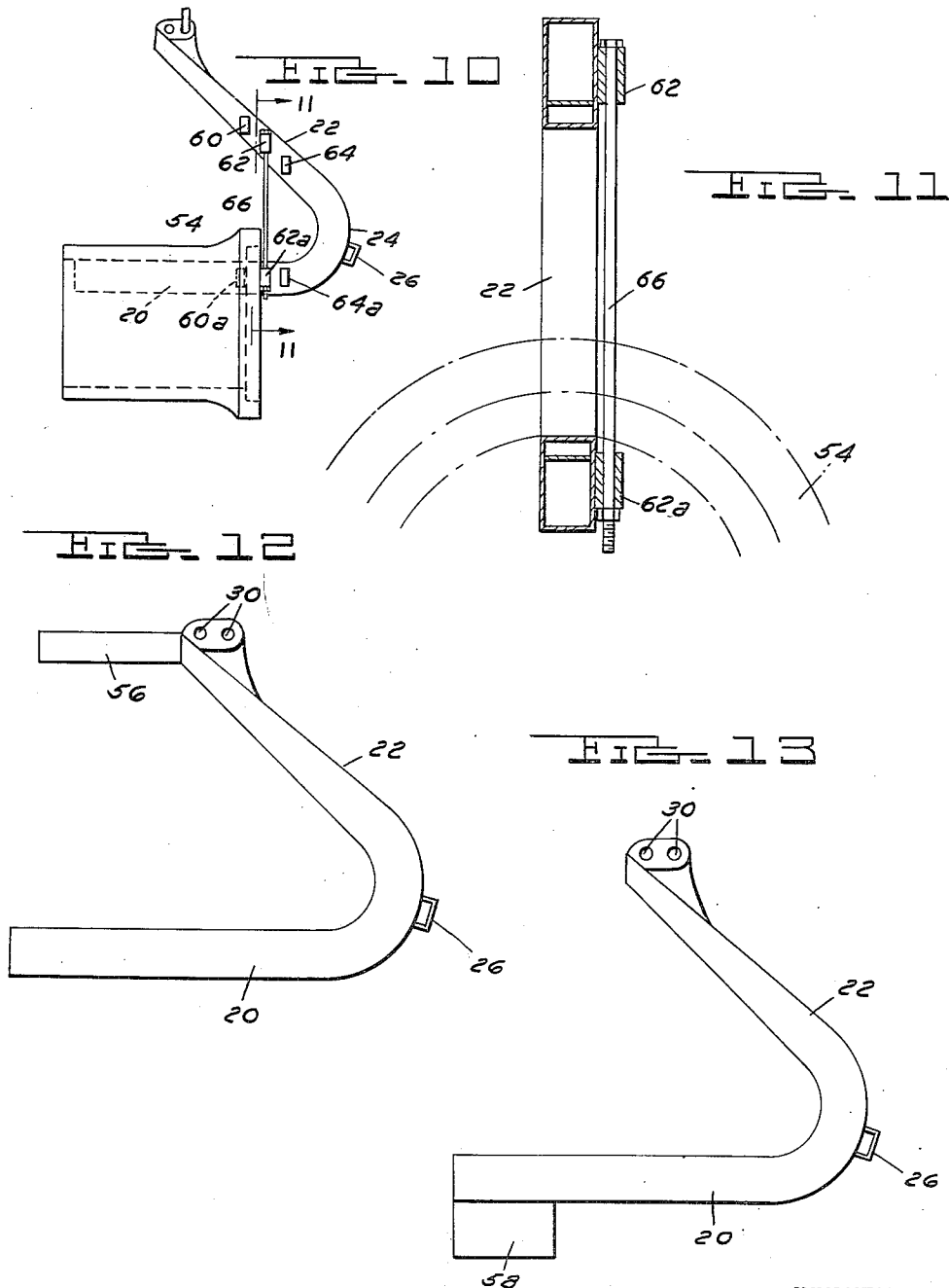
E. P. WASHABAUGH

2,801,128

PIPE LIFTING HOOK

Filed Aug. 23, 1951

3 Sheets-Sheet 3



INVENTOR.
EDWARD P. WASHABAUGH
BY
Burton & Parker
ATTORNEYS

1

2,801,128

PIPE LIFTING HOOK

Edward P. Washabaugh, Saginaw, Mich., assignor, by mesne assignments, to American-Marietta Company, Chicago, Ill., a corporation of Illinois

Application August 23, 1951, Serial No. 243,196

4 Claims. (Cl. 294—82)

This invention relates to an improved pipe lifting hook.

In the laying of sewer pipe or tunnel sections it is necessary to lift the pipe sections with a crane or other hoist and move them into position into the trench or excavation wherein they are to be laid. The hoist mechanism may be provided with a sling adapted to be passed around the barrel of the pipe, or each pipe section may be provided with an eye bolt attachment which eye can be engaged by a hook of the hoist, or the hoist mechanism may be provided with a generally U-shaped pipe lifting hook, the lower arm of which hook is adapted to be received within the pipe section to lift the same. The upper arm of the hook is coupled with the lift cable of the hoist. The instant invention relates to improvements in the pipe lifting hook of this last mentioned type.

Sewer and tunnel pipe sections are heavy objects. Each section may weigh several hundred up to several thousand pounds. A hook suitable to pick up such a section is necessarily a heavy implement. It is customary to so design such a hook that when loaded with a pipe section the lower arm of the suspended hook will assume a substantially horizontal position. When unloaded the toe or outer end of the lower arm of the hook tilts upwardly at a substantial angle. To insert the toe of the hook and the lower arm into a pipe section it is necessary for workmen on the ground to assist the crane operator by lifting the heel of the hook, thereby lowering the toe thereof, in order that the lower arm may be disposed horizontally for insertion into the pipe section. This manipulation of the hook is heavy work and requires the constant attendance of workmen to assist the crane operator in moving the hook.

My improved lift hook is so constructed and so coupled with the lift cable that it will assume, when unloaded as well as when loaded, a balanced position which permits the hook to be readily manipulated by the crane operator without the aid of a ground crew. The crane operator can so swing the hook as to insert the lower arm thereof into a pipe section to pick up the same without the aid of workmen on the ground. My improved hook is so constructed and so coupled with the hoist line that the lower arm of the hook assumes a substantially horizontal position at all times.

Preferably my improved hook is so balanced that when unloaded the toe of the hook is pointed very slightly upwardly. Such upward tilt of the toe is so slight, however, that it will not interfere with insertion of the lower arm of the hook into a pipe section. The reason for this slight upward tilt will more fully appear hereinafter.

Due to the fact that the toe of the hook tilts upwardly slightly, say one inch (1"), when the hook is unloaded, for a hook adapted to carry a 4 foot (4') section of pipe, a crane operator using the hook can lower a pipe section to the ground and take all of the weight off of the lift cable without completely releasing the hook from the pipe. The toe of the hook will retain frictional engagement with the pipe due to its slight tilt, even though

2

the load of the pipe is off the hook. If it is necessary to move the pipe slightly such can therefore be readily accomplished by the hoist operator.

Furthermore, in swinging a pipe section from a point remote from the trench in which it is to be placed to a point over the trench, preparatory to lowering the pipe into the trench, should the pipe section accidentally strike the ground, as for example the edge of the trench, the hook will not accidentally release and swing out of the pipe. The hook will not swing clear of the pipe until the hook is lowered sufficiently to completely release the toe from its frictional engagement with the pipe. Due to this meritorious feature of maintaining contact of the toe with the pipe though the load is off, the operator always has the "feel" which enables him to know what the situation is.

Another meritorious feature of my improved hook is that the toe of the hook when the hook is properly loaded tilts downwardly slightly. This downward tilt is very slight. It is insufficient to induce any displacement of the pipe section upon the lower arm of the hook, but it is sufficient to facilitate entry of the outer end of the pipe section carried by the hook into a pipe section already laid.

While it is customary to design each hook to carry a given length of pipe so that when properly loaded with a pipe section of such length the hook will assume a balanced position, my hook may be so constructed as to carry pipe sections of different lengths which when properly positioned on the hook will so load the same that the hook will assume the desired balanced position under the load.

Other objects, advantages and meritorious features of the invention will more fully appear from the following description, claims and accompanying drawings, wherein:

Fig. 1 is a side elevation of my improved hook loaded with a pipe section being inserted into one end of a pipe section already laid and with the load of the pipe carried on the hook;

Fig. 2 is a side elevation of the structure shown in Fig. 1 illustrating a pipe section carried by the hook lowered so that it is completely inserted for connection with a laid pipe section and preparatory to releasing the load from the hook;

Fig. 3 is a side elevation of the hook shown in Figs. 1 and 2 but showing the pipe section which has been carried thereby in section and with the load of the pipe released from the hook but with the toe of the hook retaining frictional contact with the pipe;

Fig. 4 is a side elevation of my improved hook loaded with a section of pipe showing a slight downward tilt at the toe end when loaded;

Fig. 5 is a side elevation of my improved hook showing interior reinforcement webs in dotted line;

Fig. 6 is a vertical sectional view taken on line 6—6 of Fig. 5;

Fig. 7 is a vertical sectional view taken on line 7—7 of Fig. 5;

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 5;

Fig. 9 is a side elevation of my improved hook loaded with a section of pipe;

Fig. 10 shows a modified form of my improved hook;

Fig. 11 is a sectional view taken on the line 11—11 of Fig. 10;

Fig. 12 illustrates a second modified form of the improved hook;

Fig. 13 illustrates a third modified form of my improved hook.

As heretofore stated, these lift hooks are designed primarily for the purpose of handling heavy sewer and

tunnel sections. The lift hooks themselves are heavy implements. The conventional type of lift hook which is balanced when loaded but unbalanced when unloaded requires workmen on the ground to direct the lower arm into the pipe section. Ordinarily when the hook is unloaded and suspended clear of the ground by the lift cable the toe of the hook tilts upwardly at a substantial angle. The heel therefore must be lifted to lower the toe to permit its insertion into a pipe section to lift the same.

My improved hook, which is shown in one preferred form in Fig. 5 is a generally L-shaped hook having a lower arm 20 and an upper arm 22. These two arms are connected by a bight portion 24 shown in this figure as provided with a handle 26. The upper arm is provided at its uppermost end with a part adapted to be coupled with a lift cable 28. Such part is here shown as in the form of a pair of eyes 30. The lift cable may be connected with either eye. The hook shown is a hollow hook. It is roughly rectangular in cross section as shown in the cross sectional views of Figs. 6, 7 and 8.

In the form shown in the first eight figures of the drawing, the outer end of the lower arm from the toe 30 inwardly is weighted. As shown in Fig. 5 it is provided with a weight 32 which may be lead. This weighted portion extends inwardly to a distance indicated by the dotted line 34 in Fig. 5. A series of reinforcing webs are provided interiorly of the hollow portion of the hook, as shown in dotted line in Fig. 6 and in solid line in Figs. 6 and 8.

There is a web element 36 which extends from the bottom of the lower arm of the hook adjacent to the weight 32 upwardly and rearwardly to the top of the lower arm. Such web would be welded at its ends to the arm. A web 38 extends from the top of the lower arm at the end of the web 36 rearwardly and downwardly to contact the rear wall of the bight, as shown in dotted line in Fig. 5. This web would be welded to the arm walls. A web 40 extends vertically from the end of the web 38 at the lower wall of the bight upwardly across the inner wall of the bight as at 42 and to the upper wall of the upper arm as at 44. This web would be welded at the ends to the walls of the hook and also at its intermediate portion to the front wall of the bight. There is a web 46 extending from the rear wall of the bight 24 to the front wall and secured in place as has been previously described. There is a web 48 disposed within the upper arm and a web 50 disposed therein as shown in dotted outline. These webs would be welded in place. The edges of the webs may of course be welded to the side walls of the hook. The hook as thus reinforced is relatively rigid.

The hook just described is so weighted that when it is suspended from cable 28 the lower arm 20 assumes a substantially horizontal position. In other words, the center of the weight is substantially along the vertical line of suspension. Preferably the weight is so distributed that the toe 30 or outer end of the lower arm tilts slightly upwardly when the hook is suspended empty. This upward tilt is very slight. It is not sufficient to interfere with the entry of the lower arm into a pipe section 54 as shown in the drawings.

In a hook of the general character shown which might be adapted to carry a four foot (4') section of pipe and the lower arm of which might have a length along its upper inner face from the curvature of the bight to its outer end of three feet four and a half inches (3' 4½"), an upward tilt when unloaded of one inch (1") from the horizontal at the outer end would be sufficient. The outer end of the lower arm of such a hook, when properly loaded with a 4' pipe section inserted thereon as shown in Figs. 1 and 2, would tilt slightly downwardly. It might tilt downwardly to the extent of one inch (1") from the horizontal. Measured in degrees an upward tilt of at least 1° and not to exceed 3° is preferred though a tilt in excess thereof either upward or downward may be used.

The slight upward tilt when empty and the slight downward tilt when loaded each serve an advantageous function. The tilt in each instance is so slight that it does not produce any unfavorable result. As heretofore stated the slight upward tilt when empty enables the hook to maintain frictional contact at its toes with the inner wall of a pipe section mounted thereon, even though the load of the pipe section has been taken off the hook. For example, when a pipe section is lowered by the hook to the ground the hook will maintain its contact at the toe with the inner surface of the pipe section even though the load of the section is taken on the ground until the hook is dropped sufficiently to release such frictional contact. In other words, the operator can retain the "feel" of the situation while handling the pipe. This action is shown in Fig. 3.

Due to the fact that the hook tilts downwardly slightly at the toe when loaded, it is possible as shown in Fig. 1, to guide a pipe section on the hook into a pipe section which has already been laid. This facilitates the laying of the sewer pipe and tunnel sections. If the pipe section were tilted upwardly at its forward end it would not be possible to so conveniently bring the same into telescoping relationship with an already laid section.

The weight distribution so as to substantially equalize the weight of the hook on both sides of the plumb line may be accomplished in different ways. In Fig. 5 the hook itself is shown as hollow. It is built up out of side wall pieces and top and bottom wall pieces welded together forming a hollow hook of substantially rectangular cross section. The hook of Fig. 5 is braced by the webs heretofore described. The toe portion of the lower arm is weighted as by being provided interiorly with a lead weight 32. This weight is provided in such quantity and so disposed that the lower arm of the hook assumes a substantially horizontal position when the hook is suspended empty but a horizontal position with a slight upward tilt of the toe as hereinabove described.

In Fig. 12, another form of weight construction is shown. The upper arm 22 is there shown as provided with a weighted extension 56 which extends forwardly from the top of such upper arm substantially parallel to the lower arm 20. This weighted extension 56 forms a counter-balancing weight which tends to cause the lower arm of the hook to assume a substantially horizontal position when the hook is suspended empty from one of the eyes 30. Two such eyes 30 are shown in each of the hook structures so that clevis clamps may be attached in either eye opening.

In Fig. 13, a second modification of weight is shown. In this construction the lower arm 20 of the hook is provided with a counterbalancing weighted portion 58 depending therefrom as shown in such figure. This weighted portion 58 serves the same purpose as extension 56 or the lead weight 32 to equalize the balance of the hook so that it will assume a balanced position when empty as well as when loaded.

In Figs. 10 and 11, there is shown a hook which is designed to receive pipe sections of different length. Such hook is illustrated as provided with socket elements 60, 62 and 64 on the upper arm and corresponding socket elements 60a, 62a, and 64a on the lower arm. A pin 66 is provided which is receivable as shown in Figs. 10 and 11 through the socket elements. This pin forms an abutment which determines the distance that the pipe section is received upon the hook. It is apparent that the pin may be inserted through any one of the three pairs of sockets and that pipe sections of three different lengths may be received on the socket as determined by the position of the pin. In addition, the hook would be adapted to receive a pipe section which was positioned thereon by having the end of the section abut the bight of the hook rather than the pin as shown in Figs. 1 and 2.

In all cases it is desirable that the length of the lower

arm be such that it will not project through a pipe section. Preferably, it terminates short of the outer end of the pipe section. If the arm projected entirely through the pipe it might interfere with the telescoping of the pipe carried by the hook into a pipe already laid. Therefore though the distance between the center of the mass of the hook as measured on the lower arm and the outer end of such lower arm is approximately the same as the distance between such center of mass and the heel of the hook as measured on the upper face of the lower arm, it is evident that the overhang of the pipe section beyond the outer end of the lower arm when the hook is loaded will weight the hook so that there will be a slight downward tilt as shown in Fig. 1.

This slight downward tilt of the toe end of the hook is illustrated in Figs. 4 and 9 as well as in Fig. 1. In Fig. 4, the hook is shown as loaded with a section of pipe with the female end of the section inwardly toward the bight of the hook. The solid line *x* shown in the figure is a horizontal line of reference employed merely to show the downward tilt of the outer end of the pipe section. In this figure the hoist line 28 is shown as connected to the rear eye opening 30. In Fig. 9, a similar view is shown but in this figure the pipe section is illustrated as loaded upon the hook with the male end of the pipe section inwardly. The same downward tilt is apparent. The solid line *x* is a reference line to indicate the horizontal.

In both these Figures 4 and 9, it will be seen that the pipe sections of smaller diameter are illustrated as compared with the pipe sections of Figs. 1 and 2. These sections are therefore lighter in weight than the pipe sections shown in Figs. 1 and 2. In Figs. 1 and 2 the pipe sections are shown as seated against the bight of the hook. In Figs. 4 and 9 they are not shown as completely seated but they are approximately seated. The weight of the pipe section is such that an approximate seating in this instance is satisfactory. The pipe section tends to seat itself upon the hook with the inside of the flat portion of the pipe at the end thereof approximating the point of curvature of the bight of the hook at its junction with the lower arm of the hook. This is true of Figs. 4 and 9.

It is desirable that the hook release itself readily from a pipe when the weight of the pipe is removed from the hook. It is therefore desirable that the upper arm of the hook slide off the pipe easily. In the figures of the drawings the upper arms of the hooks shown are disposed approximately at angles of 45° with respect to the lower arms. Such an angle of pitch has been found satisfactory. Hooks having upper arms set at 60° have been used but while such a hook will slide off the pipe very readily it possesses the disadvantage of increased weight as compared with those shown. While hooks having upper arms of angles of less than 45° might be used they do not slide off the pipe sections so readily as is desired.

What I claim is:

1. A generally L-shaped pipe lift hook having an upper arm provided with a part mounted in stationary relation thereupon to be coupled with a hoist line whereby the hook may be suspended from the line and having a lower arm adapted to be received within a section of pipe, said hook being hollow and provided with interiorly disposed bracing webs within the hollow portion of each arm and

within the bight portion of the hook and further having a weight disposed within the interior of the lower arm and adjacent to the toe end thereof, said weight being sufficient to maintain the lower arm of the hook tilted slightly upwardly when the hook is suspended empty from a hoist line connected to said part of the upper arm.

2. A generally L-shaped pipe lift hook having an upper arm provided with a part adapted to be coupled with a hoist line whereby the hook may be suspended from the line and having a lower arm adapted to be received within a section of pipe, said hook being hollow and provided with interiorly disposed bracing webs within the hollow portion of each arm and within the hollow bight portion of the hook and further having a weight disposed within the interior of the lower arm and adjacent to the toe end thereof, said weight being sufficient to maintain the lower arm of the hook tilted slightly upwardly when the hook is suspended empty from a hoist line connected to said part of the upper arm, said suspension hook adapted when loaded with a pipe section mounted on its lower arm with the lower arm disposed entirely therein to terminate short of the outer end of the pipe section to tilt slightly downwardly.

3. A generally planar L-shaped pipe-lifting hook having an upper arm provided with a part mounted in stationary relationship thereupon to be coupled with a hoist line and having a lower arm adapted to be received within a section of pipe to be lifted by the hoist, said lower arm provided with a counterbalancing weighted portion at the outer free end which is of the same cross sectional shape as the lower arm and forms an extension thereof and counterbalances the weight of the hook lying on the opposite side of the vertical line of lift from the free end of the lower arm, whereby the center of mass of the hook will lie substantially on the vertical line of lift when the hook is suspended empty by said part from the hoist line, and said vertical line of lift as measured along the lower arm falling substantially midway between its outer free end and the inside of the bight of the hook at its other end when either the hook is empty or loaded.

4. The invention as defined in claim 3 characterized in that said hook is hollow and the counterweighted portion of the lower arm comprises a weighted member disposed within the lower arm at the outer free end thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

50	597,438	Schilling	Jan. 18, 1898
	662,342	Berry	Nov. 20, 1900
	1,390,650	Smith	Sept. 13, 1921
	1,761,037	Gross	June 3, 1930
	1,862,081	Grant	June 7, 1932
55	2,133,557	McNeillie	Oct. 18, 1938
	2,220,596	Bernhardt	Nov. 5, 1940
	2,338,998	Cassens et al.	Jan. 11, 1944
	2,358,767	Breslau	Sept. 19, 1944
	2,404,602	Stofflet	July 23, 1946
60	2,495,658	Moseley	Jan. 24, 1950
	2,514,307	Boyd	July 4, 1950
	2,600,538	Jacks et al.	July 17, 1952
	2,697,000	Giffin	Dec. 14, 1954